CLAIMS:

1.   A data processing device (3) for reconstructing the current flow in a vessel
system (6), comprising a memory (4) with measurement data (m$_i$) describing an observed
progressive propagation of a medium in the vessel system (6), wherein the data processing
device (3) is equipped to reconstruct, from the measurement data, a model propagation (t$_i$) of
5   a medium within the vessel system in such a way that, for the vessel system:

        - the difference between the observed propagation and the model propagation
is minimal, and

        - the model propagation is monotonously progressive.

10 2.   A data processing device as claimed in claim 1, equipped to reconstruct the
model propagation (t$_i$) in such a way that it additionally has as smooth as possible a
progression.

3.   A data processing device as claimed in claim 1, characterized in that the
15 memory (4) contains, as measurement data, bolus arrival times m$_i$, wherein i=1,...N are
indices for various individual sections of the vessel system (6), and a bolus arrival time m$_i$ is
the time, determined in a measurement, which a medium requires, starting from a
predetermined starting point, to reach vessel section i.

20 4.   A data processing device as claimed in claim 3, characterized in that it is
equipped to calculate model bolus arrival times (t$_i$) for the vessel sections i in such a way
that:

$$\Delta_i = t_i - t_{p(i)} \geq 0 \quad \forall\, i = 1,...N-1 \tag{1}$$

and the cost function

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$$E = \sum_{i=1}^{N} |m_i - t_i| \tag{2a}$$

is minimal, wherein the values p(i) each hereby reflect the index of the vessel
section located in front of vessel section i in the direction of flow.

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5.   A data processing device as claimed in claim 4, characterized in that it is equipped additionally to take into account in the cost function the variable:

$$E_m = \sum_{i \in I} \left| t_i'' \right| . \hspace{3cm} \text{(2b)}$$

wherein I contains the indices of all vessel sections with a predecessor and a

5   successor, and t_i'' is the discrete approximation of the second derivative in vessel section i.

6.   A data processing device as claimed in claim 4, characterized in that it is equipped to calculate the model bolus arrival time (t_i) using linear programming.

10   7.   A data processing device as claimed in claim 1, characterized in that it is coupled with a display device (7) in order that the model propagation may be graphically represented.

8.   An assembly for observation of the current flow in a vessel system (6),
15   comprising an image-generating device (1) for generating images of the vessel system (6), from which measurement data (m_i) describing the progressive propagation of a medium may be obtained, and a data processing device (3) as claimed in any one of claims 1 to 7 for reconstructing the current flow in the vessel system.

20   9.   An assembly as claimed in claim 8, characterized in that the image-generating device is an X-ray apparatus (1).

10.   A method of reconstructing the current flow in a vessel system (6), comprising the following steps:
25   a) Obtaining measurement data (m_i) describing an observed progressive propagation of a medium in the vessel system (6).
                b) Reconstructing a model propagation (t_i) of a medium in the vessel system in such a way that:
                - the difference between the observed propagation and the model propagation
30   is minimal, and
                - the model propagation is monotonously progressive.